

## MEDICAL CARE OF PEPTIC ULCER\*

By HOWARD R. HARTMAN, M. D.

Rochester, Minnesota

A PEPTIC ulcer is a benign lesion of the stomach or duodenum. Perhaps it is secondary to a localized change in the wall of the viscus that in turn is followed by a digestive phenomenon evident at the site of the ulcer. The healthy stomach and duodenum have an inherent protective mechanism against autodigestion; this may be deranged by interference with the blood supply and consequent local structural change in the wall. At this point digestive phenomena may cause loss of tissue and the formation of an eroded, ulcerated lesion. This is purely a hypothesis that seems logical in the light of clinical observations and the study of laboratory data. Preliminary injury to the region where ulcer occurs can be produced experimentally by a host of detailed ways that can be considered in groups: (1) alteration of specific nervous function; (2) mechanical and chemical injury to the wall, directly or through the blood supply; and (3) attack on the wall by bacteria carried in the blood from a distant focus. Durante, after studying seventeen possible ways of producing ulcer experimentally, conducted a series of experiments on the nervous system of animals, and concluded: "Ulcer may be produced by any agent capable of damaging the sympathetic nervous system, as it is on the integrity of this system, which controls circulation, secretion and profound sensibility in the stomach, that the very life of the gastric cell may be said to depend. The theory of trophic ulcer must be taken in this sense." The manner in which strong psychic stimuli are capable of altering normal vasomotor control is known. Blushing is an example. How psychic stimuli affect not only gastric secretion and motility, but the secretion of other glands and organs also is known. This possible factor, the psychic state, requires consideration in the study of the etiology of ulcer. Furthermore, it seems to be an important factor in effecting a cure for ulcer.

Mann and Williams stated the belief that injury at the time of an experiment, and gastric digestion, lead to ulceration. Mann noted acute ulcers in cats and dogs after the suprarenal glands had been removed. Ulcers developed, also, when the pancreatic juices were excluded and the fluids that bathed the tissues were acid in reaction. These two instances are classical examples of a host of reported experiments that illustrate the chemical and the mechanical theory for the origin of ulcer. These theories are well enough established to have their influence on the medical treatment of ulcer.

Although bacteria in association with ulcer were noted in 1874, to Rosenow goes the credit of establishing the elective localization of bacteria. At The Mayo Clinic his principles are in

constant clinical application in the treatment of ulcers as well as of other infectious diseases. Reeves, by injection of gelatin into the arteries that supply the stomach, demonstrated end capillaries at the usual site of ulceration in the stomach and duodenum. This offers an anatomic basis for the localization of infected emboli at the usual site of ulceration.

The exponent of each hypothesis concerning the development of an ulcer can disprove that of his opponents by his data. I believe that an ulcer does not develop from a single process, but that a combination of events is required. It may be that a single insult from one or more of the possible causes will not produce a chronic ulcer, but that constant repetition of the offense will lead to the classical peptic ulcer. The term "peptic ulcer" implies digestion of protein material carried on by the pepsin of the stomach. Pepsin is active only in the presence of adequate free hydrochloric acid. If one can neutralize that acid in or out of the stomach, digestion by pepsin cannot take place. As a corollary, one would expect that an ulcer of the stomach or duodenum could not be active in the presence of an acidity. I have yet to be convinced of the contrary. One might argue that duodenal ulcer could arise because of digestion by pancreatic juice. Proof of this is lacking, and the contrary has been shown. Still, I am open to conviction. Eusterman, in an unpublished study, reviewed forty-three surgical cases in which persistent achlorhydria was present but in which an ulcer was discovered at operation. However, the surgeon reported that most of these ulcers were healed.

The foregoing remarks are prefatory. Medical treatment of ulcer must be directed against the several causative factors mentioned. Preferably, it should be carried out in a hospital where the patient is under daily observation and control. It is essential to begin the treatment with complete, or nearly complete, neutralization of the free hydrochloric acid, and cure depends on one's ability to hold the acids in check after a period of complete neutralization. It is possible to do this in properly selected cases, and in making the selection it is necessary to consider several matters: (1) the status of the ulcer; (2) complicating surgical conditions; (3) the social status of the patient; and (4) the native intelligence of the patient and his willingness to coöperate and carry on when not under supervision.

*The Status of the Ulcer.*—Mechanical defects in the digestive system must be dealt with mechanically. Obviously a scarred, contracted, pyloric outlet which is the result of repeated periods of exacerbation, healing and contraction, will not be enlarged by diet. The pain and hyperacidity might be controlled, but retention of gastric content as evidenced by vomiting of the retention type or by the finding of gastric residue on intubation, could not be relieved. The procedure in acute perforation of ulcer is not open to question. Chronic perforation demands operation if some mechanical irregularity results, although perforation temporarily cures the ulcer. Repeated

\* From the Department of Medicine, The Mayo Clinic, Rochester.

\* Read before the Nevada State Medical Association, Elko, September 27-28, 1929.

profuse hemorrhages preclude medical treatment; isolated or infrequently repeated hemorrhages do not. Operation does not guarantee freedom from hemorrhage. Uncomplicated gastric ulcers respond readily to medical treatment. However, unless the patient can be kept under observation for years, one hesitates to treat gastric lesions medically because of the fear of carcinoma being present in the ulcer, or because of the fear that it will develop. A duodenal ulcer practically never becomes malignant.

*Complicating Surgical Conditions.*—If such a condition as cholecystitis or appendicitis is discovered it demands primary attention. In the course of the operation for such a disorder, if the patient's condition warrants it a conservative operation for relief of the ulcer can be undertaken. However, the surgeon's experience should be sufficiently broad to enable him to decide that surgical and not medical care offers the best chance of cure. Frequently, visualization of an ulcer by roentgenologic methods, or at the operating table is too tempting to an ambitious surgeon. Many completely healed ulcers probably have led to needless gastro-enterostomy, pyloroplasty, excision, and resection of the stomach.

*Social Status of the Patient.*—No matter how carefully one starts a course of medical treatment, it must be completed to accomplish its purpose. If acidity is controlled by care of the patient in hospital and he is made symptom-free only to find that his resources are exhausted, and that he must return to his job with the section or road gang, he finds himself subject to those factors that led to the development of his ulcer and he has recurrence of symptoms. In such a case the treatment is not to be considered inadequate. However, the patient should not have been accepted as a subject for trial of the medical regimen. It would have been better for him to take the shorter, surgical route to health.

*Native Intelligence of the Patient and His Willingness to Coöperate When Not Under Supervision.*—It is discouraging to find a patient who demands food that pleases his taste in spite of its possible effect on his ulcer. It is hopeless to have some patient report that he does not like milk, and consequently to have him demand that something else be prescribed for him. The patient who says that he is starving, when the intake of calories is adequate and has been calculated for his needs, is not a suitable subject to undergo the medical regimen. And then it is disheartening to find that a patient who has followed your advice to the letter as long as you made daily calls, has disregarded your advice as to his future conduct, because he was feeling all right. In spite of all one may do, ulcers may recur; but the number of times that this happens is probably in direct proportion with violation of principles designated to prevent it.

#### OBJECTS OF MEDICAL TREATMENT

After the patient has been properly selected what is to be done? Needless to say, all the information regarding acidity, roentgenologic evi-

dence as to the kind of ulcer present, and the evidence concerning foci of infection in teeth, tonsils or prostate gland must be at hand. The first object of the treatment is to neutralize acidity. Gastric acidity is produced under the influence of the nervous system, the chemical nature of the food, and its physical properties. To my mind, the neurogenic theory of the stimulation of gastric glands to the production of hydrochloric acid is the most potent. Patients who have ulcer are all stimulated; they usually come from only one stratum of society, only from those who have ambition, and usually ambition greater than their physical endurance and nervous stability. Not infrequently they are passing through some nervous crisis at the time the ulcer develops and each added shock to the nervous system is reflected in an exacerbation. I had a friend, an influential stock broker, who made each customer's problems his problems. I knew this man to have an ulcer for years, and I observed that his gastric upsets were coincident with the depressions in the stock market. I have now on my service at the hospital a woman, aged thirty-three years, who is married to a man aged sixty years. The marriage took place ten years ago. The man has money. She says that she has had ten induced abortions each after gestation of three months, and she wears diamonds. Her husband is jealous, demands constant attention to his wants and infirmities, but cannot recognize symptoms in his wife. He has demanded her constant presence for ten years. The picture, I think, is clear. She has a chronic duodenal ulcer, with a crater.

There is no need to multiply illustrations. The cause of this strain may be very elusive; detailed search is often necessary to find it. Yet it is imperative to be able to discuss it with the patient, for, I think, by so doing you help him as much as by drugs and diet to get rid of his ulcer. I do not profess to be a psychiatrist or neurologist. Nevertheless, I feel that if one can gain the confidence of the patient, and by a subsequent hint can cause him to relate the tale of woe that in some way affects the nervous system, perhaps the sympathetic nervous system as suggested by Durante, one often can disclose one of the causes of ulcer and hyperacidity. A great deal of help for this jaded nervous system is to get the patient out of his environment. At home in bed, or in a hospital in his home town, the factors which are nervously irritating are too prevalent, even under the best of circumstances. That is why I think medical treatment for ulcer is most effective when the patient is in a strange place. As more specific treatment while in the hospital, the patients are given some sedative. Phenobarbital, gram 0.097 (grains  $1\frac{1}{2}$ ) once or twice a day, or perhaps bromids, or sodium iso-amylethyl barbituric acid, gram 0.097 (grains  $1\frac{1}{2}$ ) are beneficial. I feel certain that the neurogenic influence in ulcer prepares the soil for the inflammatory lesion that is called peptic ulcer. Certainly, correction of the

nervous condition as far as possible, is essential to cure, medical or surgical.

Now, assuming that the malfunctioning nervous system is understood and adjusted, the food chosen must be such as will reduce acidity. Certain foods have within themselves chemicals called secretagogues, which chemically irritate the gastric mucosa to produce free hydrochloric acid. Notorious among such foods are the red meats; to a less degree, other meats. The proteins of milk and eggs are practically free of secretagogues. Hence at first meats are eliminated from the diet and milk alone is used; later, eggs in suitable form are added. Another method by which free hydrochloric acid is produced is by mechanical irritation of the mucosa. Consequently in attempting to reduce the quantity of free hydrochloric acid rough foods are eliminated from the diet. Even when the patient is pursuing an ambulatory regimen, after dismissal from the hospital, foods that are necessary for maintenance of an adequate intake of salt and vitamins and for a balanced diet, but which are rough and fibrous, should be served in the form of purées. None of the food should be excessively hot.

#### TECHNIQUE OF THE TREATMENT

The method of feeding patients while they are in the hospital is as follows: 90 to 120 cubic centimeters (three to four ounces) of a mixture of milk and cream, 50 per cent of each, are given every hour from seven o'clock in the morning until nine o'clock in the evening, for seven days. In many patients, perhaps in most patients, such a diet alone is not adequate to keep the free hydrochloric acid neutralized. Consequently, alkalis are administered on the half hour, only in sufficient quantities to control the acidity, as determined by aspirations of the gastric content and its analysis. Aspirations are begun on the third or fourth day of treatment; the small Rehfuß tube is used. Occasionally alkalis can be omitted, and if so, so much the better, for all alkalis are known to have a tendency to produce alkalosis, except perhaps a few newer ones, if we can believe the claims of the manufacturers. The aim is to minimize the amount of alkali given and yet control the acidity. At the onset, one of two powders is given on the alternate half hours, as follows; number one is made of calcium carbonate gram 0.65 (grains 10) and bismuth gram 0.50 (grains 8); number two, of calcium carbonate gram 0.65 (grains 10) and magnesium oxid gram 0.85 (grains 13). The magnesium has a secondary value in helping to overcome the constipation that is secondary to a concentrated diet. This amount of alkali is often found to be in excess of the patient's needs; occasionally more is required. If it becomes necessary to exhaust all means known to neutralize the acidity a poor outcome can be predicted whether medical or any other treatment is used. In difficult cases, especially when aspiration of gastric content reveals hyperacidity and hypersecretion, belladonna given in divided doses until the physiologic effect is obtained is of great assistance. In neurotic patients who have pylorospasm belladonna has no

equal. Doses of ten to fifteen drops three times a day are used. Blonde persons do not tolerate belladonna as well as do swarthy persons. Constipation is to be avoided; any one of the many preparations of mineral oil, with agar, can be given with advantage to action of the bowels and without bad effects on the ulcer; in fact, I think it helps healing of the ulcer.

All feedings end at nine o'clock in the evening and are not resumed until seven o'clock in the morning. These ten hours without food occasionally lead to secretion of acid, with symptoms. The symptoms call for nocturnal intubations that reveal the acidity, the neutralization of which brings relief. Rather than to let the patient wait for the development of symptoms before neutralization is attempted day or night, it is best to anticipate the symptoms and to neutralize the acid before it has accumulated in sufficient amounts to produce symptoms; consequently, when distress at night is once reported, the patients are given feedings and powders at night. Usually feedings at intervals of two hours during the night are more than adequate, and often one or two feedings are found to suffice. Except in stubborn cases, four to six nights are usually all that are required for training the stomach to be at rest during the sleeping hours.

Medicines and diet cannot overcome irregularities in conduct; coöperation is what cures ulcers. It is a tragedy to most patients who have ulcer to ask them to stop the use of tobacco. Nevertheless it must be done. Tobacco does not cause ulcer any more than meat causes ulcer; yet tobacco has a tendency to increase gastric secretion and acidity. An old German friend of mine once said, "A big meal is a fine thing because you can smoke so much better afterwards." The large meal created a need for more gastric juice, and the tobacco supplied the stimulus. More scientific proof of the effects of tobacco on gastric digestion was demonstrated by one of our laboratory physicians who had an ulcer. He pooh-poohed the idea that smoking was detrimental until he experimented on himself. With a small Rehfuß tube in place, he studied his gastric contents while he was using tobacco and while he was not using it. He found that he could cause an increase in the acidity of his gastric content to various levels, depending on the number of cigarettes he smoked.

Alkalis are given every hour until the end of the three weeks of hospitalization, unless toxic symptoms develop. There is danger of giving alkalis to excess and of producing certain prodromal symptoms which become accentuated into definite symptomatic reactions corresponding with the changing chemistry of the blood. These symptoms can be increased even to the point of tetanic convulsions unless the administration of alkalis is materially reduced or stopped. Rivers reported at length on observations relative to alkalosis. Since we have recognized this condition at the Clinic we have not seen a typical case of alkalosis develop under treatment, not only because we have learned that we can administer smaller

amounts of alkalis than usually are prescribed and still bring about neutralization of the acids, but also because we have learned to recognize those prodromal symptoms which tell the physician that the condition of the patient is bordering on intoxication. One of these symptoms is aversion to milk. The patient complains that the milk is too rich or has too much the "taste of a cow." This is associated with a little nausea and a headache of low grade. In the more severe forms, the nausea assumes the proportions of vomiting, and the headaches become worse. Should these symptoms not be recognized and the treatment be persisted in, prostration, with profuse perspiration, develops; at this time, if not before, one finds that there is an elevation in the blood urea and in the carbon dioxid combining power of the blood, with diminution of the chlorids. I have not found it necessary to analyze the blood for this altered chemistry, because, at the first sign of intoxication, that is, aversion to milk and a little headache, administration of all alkalis is stopped. Usually the order is given that administration of milk be interrupted and that the patient be given a soft diet. Fruit juice, preferably orange juice, is given in doses of four ounces every few hours if necessary. From twenty-four to forty-eight hours of such treatment makes it possible, in many cases, to resume the previous treatment and to continue it without interruption. Occasionally, however, it is not possible to carry on the treatment to its completion because the patient is intolerant of the alkalis and the diet.

In the second week the patient's diet is increased a little. Milk soups, gelatin, cooked cereals, with cream, custards, and the like, are served three times a day. The feedings of milk and the alkalis are kept up on the half-hourly basis.

During the third week the diet is materially enlarged. Practically only those foods that either by chemical or mechanical action stimulate gastric acidity are eliminated, and during this third week of hospitalization the patient continues the half-hourly feedings of alkalis and milk. If the patient has lost weight during the early period of the treatment, the lost weight is regained by this forced diet, in which the intake usually is in excess of the 2000 calories a day. On dismissal from the hospital the patient is admonished not to depart from instructions because of the penalty of an exacerbation of the ulcer. His meals are patterned after the third week diet with sufficient calories for an ambulatory life. Milk is taken only midway between the three regular meals. He is cautioned as to his environment and mental and physical strains, principally the former. He is urged not to revert to the use of tobacco, to abstain from condiments, to take at least six alkaline powders a day, one an hour before and one an hour after meals, to be certain of adequate hours of rest, and to follow this regimen for a period of six months. At the end of six months, a report usually is requested.

All foci of infection should be eradicated. This declaration is based on experimental research.

Infected teeth and tonsils should be removed and occasionally prostatic massage is indicated. Many times the judgment as to what is an infected tooth plays an important part in bringing about a cure. According to the interpretation of the dental roentgenographic film, which is applied by my associates and me, any dead tooth or any tooth with a devitalized root is infected, irrespective of whether bacterial action has gone on to rarefaction of the bone that is evident roentgenographically. Eradication of foci usually is begun in the second or third week of treatment in hospital.

The contraindications to medical treatment of ulcer are few. Patients with nephritis, of course, do not tolerate well the alkaline treatment, and the same is true of persons who are suffering from so-called essential hypertension. Elderly persons do not withstand vigorous alkalization. Under such circumstances one must temper the treatment according to the complicating factors, but as a rule all persons who are suitable subjects stand the treatment very well. Experience at the Clinic has led us to believe that if, in the first few weeks of treatment, a patient makes prompt symptomatic response, and if the chemical analysis of the gastric content shows that the acids are easily controlled, the prognosis is good whether the medical regimen is continued or whether operation is performed.

#### SUMMARY

Active peptic ulcer probably is caused by multiple factors. Experimental data offer theoretical explanations of the causes of ulcer in the human being, namely: neurogenic influences, traumatic influences, and occult foci of infection. The activity of an ulcer seems to depend on the degree of free hydrochloric acid present. An active ulcer cannot exist in the presence of anacidity. Non-surgical relief is possible by removing the inciting factors as completely as possible and by neutralizing, with a suitable diet and alkalis, the acid that is formed in spite of means to reduce secretion. The diet prescribed is free from chemical, thermal, and mechanical irritating factors. Cooperation and good general conduct of the patient, together with continuance of a suitable diet and medication after leaving the hospital, for a period of months, are of vital importance in the ultimate cure. Of equal importance is removal of occult foci of infection.

The Mayo Clinic.

#### REFERENCES

- Boettcher, H.: Zur Genese des perforirenden Magengeschwürs, *Dorpater Med. Ztschr.*, 1874, v, 148-151.
- Durante, Luigi: The Trophic Element in the Origin of Gastric Ulcer, *Surg. Gynec. and Obst.*, 1916, xxii, 399-406.
- Mann, F. C.: A Study of the Gastric Ulcers Following Removal of the Adrenals, *Jour. Exper. Med.*, 1916, xxiii, 203-209.
- Mann, F. C., and Williamson, C. S.: The Experimental Production of Peptic Ulcer, *Ann. Surg.*, 1923, lxxvii, 409-422.
- Reeves, T. B.: A Study of the Arteries Supplying the Stomach and Duodenum and Their Relation to Ulcer, *Surg., Gynec. and Obst.*, 1920, xxx, 374-385.